

1,24(1)

Author: Akhiezer, A. I., Polovnikov, A. A.

3 1/56-1-5-11 1

Title: On a Variant of the Nonlocal Theory of the Electromagnetic Field (ob odnom variante nelokal'noy teorii elektromagnitnogo polya)

Publication: Zhurnal teoreticheskoy i teoreticheskoy fiziki, 1965, Vol. 6, No. 2, pp 654-656 (USSR)

Abstract: Several authors (Ref's 1-5) investigated a variant of the nonlocal electromagnetic field theory and used a potential of the Liénard-Wiechert (Liénard, Wiechert) type  

$$\Delta \mu = -\frac{1}{c} \frac{\partial}{\partial t} \left( \frac{1}{R} \frac{\partial \mu}{\partial t} \right)_{R^2 + z^2 = 0} \text{ with } \Delta \mu = -\frac{4\pi}{c} j \mu.$$

The present paper intends to show that this variant leads to unsatisfactory results and that the suggested potential form and the resulting smearing out of the energy lead to an internal contradiction: to incompatibility of the system of classical equations for charged particles. The correctness of this statement made by the authors, which is considered as the main result of this paper, is proved by means of a consistent

1 1 2

Department of the General Theory  
of Electrodynamics

U.S.S.R. - 1950

relativistic treatment, viz. by a transition to the covariant formalism (1.4) of the classically electrodynamics description of a system of charged particles.  
There are references, 2 of which are Soviet.

1. : Vizing, I. Institut im. I. A. Lebedeva A. Acad. Sci. U.S.S.R. (Institute named I. A. Lebedev of the Academy of Sciences, U.S.S.R.)

2. : September 10, 1950

1950

MARKOV, M. A.

"Weak Interactions and Experiments with High Energy Lepton Beams."

report submitted for the 10th Intl. Conf. on High Energy Physics, Rochester, N.Y.  
25 Aug - 1 Sep 60

Joint Inst. for Nuclear Research, Dubna.

MARKOV, M. A.

1. DISCUSSION - continued

001/5502

International Conference on Education, 1959, pp. 22, 1959.

Project was completed by [redacted] on July 17, 1965.  
Physics Dept., July 18-19, 1965. 700 p. 2, 5 copies  
distributed.

By sending it to: All of them. I. Technology, Social History & Culture.

C. Contributors not within A.

REMARKS: This is a good example of a typical "bait" trap.

C. "7: 1-10-1911

25 July 1964

cc: 1/5

3

Ninth International Conference (Cont.)

807/5982

nucleons, their structure, weak and strong interactions, scattering, and their decay. No personalities are mentioned. References accompany individual articles.

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BOX/5982

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Card 5/8

MARKOV, M.A.

Current form of atomism. Fiz szemle 11 no.6:163-171 Je '61.

MARKOV, M.A.; SARANTSEVA, V.R., tekhn. red.

On weak interaction theory. Dubna, Ob"edinennyi institut  
iadernykh issledovani, 1962. 6 p.  
(No subject heading)



MARKOV, M. A.

"On weak interaction theory"

report presented at the Intl. Conference of High Energy Physics, Geneva,  
4-11 July 1962

Laboratory of Theoretical Physics, Dubna, 1962

KUMAR, A. A. and MARKOV, M. A.

"Possible evidence of the direct electron-neutrino interaction"

report presented at the Intl. Conference on High Energy Physics, Geneva,  
4-11 July 1962

MARKOV, M. A.

"On a Method of Regularization in Field Theory"

report presented at the Intl. Conference on High Energy Physics, Geneva,  
4-11 July 1962

Joint Institute Nuclear Research  
Laboratory of Theoretical Physics, Dubna, 1962

MARKOV, M.A.; SMIRNOVA, L.A.[translator]; SARANTSEVA, V.R., tekhn.  
red.

On a regularization method in the field theory. Dubna,  
Ob"edinennyi in-t iadernykh issledovaniy, 1962. 16 p.  
(No subject heading)

S/048/62/026/006/009/020  
B125/B102

AUTHORS: Zheleznykh, I. M., Zatsepin, G. T., Kuz'min, V. A.,  
and Markov, M. A.

TITLE: Neutrino physics of high energies in cosmic rays

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya,  
v. 26, no. 6, 1962, 738-741

TEXT: Some possibilities of neutrino physics in cosmic radiation are evaluated. The energy spectrum and angular distribution of the products (e.g. muons) of cosmic neutrino reactions with matter can be calculated accurately. The low intensity of the neutrino flux necessitates using large-area measuring equipment, e.g. several series of scintillators. Muons may result from the reaction

$$(a) \nu + n \rightarrow p + \mu^- (e^-).$$

$$(b) \bar{\nu} + p \rightarrow n + \mu^+ (e^+).$$

$$(c) \bar{\nu} + n \rightarrow \Sigma^- + \mu^+ (e^+).$$

$$(d) \bar{\nu} + p \rightarrow \Sigma^0 + \mu^+ (e^+).$$

$$(e) \bar{\nu} + p \rightarrow \Lambda^0 + \mu^+ (e^+).$$

(1).

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S/048/62/026/006/009/020  
B125/B102

Neutrino physics of high energies ...

In the case of point interaction, the reaction (1a) has the cross section  $\sigma_{\nu} \approx 1.5 \cdot 10^{-38} E_{\nu} \text{ cm}^2$  and  $\sigma_{\bar{\nu}} \approx 0.5 \cdot 10^{-38} E_{\nu} \text{ cm}^2$  ( $E$  in Bev) holds for (1,b,c,d,e). When the energies increase to above the Bev range, the cross sections are modified by a form factor. The four-fermion interaction involving baryons and also total interaction can be cut off by the Hofstadter form factor. In this case, weak interactions could supply information as to the usual electromagnetic form factors of the nucleon. If, using the laboratory system, the cross section of the  $\nu + N \rightarrow N' + \mu$ -type reaction is not cut off up to neutrino energies of  $E_{\nu} = 300$  Bev, an apparatus with an active area of  $300 \text{ m}^2$  is capable of recording annually 70, 50 and 30 muons at thresholds of 0.5, 1 and 3 Bev, respectively. In the case of cutting off with the Hofstadter form factor, 12, 9 and 3.5 events are recorded annually at thresholds of 0.5, 1 and 3 Bev, respectively. In connection with the possible existence of an intermediate boson, reactions of the type

$$\nu + Z \rightarrow W + \mu + Z', \quad \bar{\nu} + Z \rightarrow W + \mu + Z', \quad (4),$$

$$\bar{\nu} + e^- \rightarrow W \rightarrow \mu^- + \bar{\nu}, \quad (5),$$

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Neutrino physics of high energies ...

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B125/B102

$$\nu + n \rightarrow W' \rightarrow p + \mu \quad (6)$$

$$\bar{\nu} + p \rightarrow W' \rightarrow n + \mu.$$

are of interest. When the neutrinos  $\nu_\mu$  and  $\nu_e$  are of different natures, the reaction (5) can be due only to  $\nu_e$  neutrinos from muon decay. The result obtained by J. C. Barton (Phys. Rev. Lettrs. 5, 514, 1960) furnishes no proof for the absence of an intermediate boson with the mass of the K-particle. In the first stage of a subterranean experiment the muons produced during the reactions (1) will be recorded, as electrons are much more difficult to record. There are 3 figures.

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3h016

3/056/62/042/001/040/040  
1113/0104

24.6700

AUTHORS. Markov, M. A., Hanoi Van-ki'eu (Hanoi University)  
TITLE. Neutral baryon currents and single production of hyperons  
PERIODICAL Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 4, no. 1, 1962, 213 - 214

TEXT An experimental study of weak interaction processes between baryons, as  $n + n \rightarrow n + \Lambda$  or  $p + p \rightarrow p + \Sigma^+$  may essentially give information on the existence of neutral baryon currents. First-order perturbation approximation for existing neutral baryon currents yields the cross section  $\sigma \approx 4 \cdot 10^{-38} \text{ cm}^2$  for the above processes when the incident nucleons have an energy of 1 Bev. This relatively high value is due to the great mass of the baryons. If there is no neutral baryon current, the above processes can proceed only through various intermediate states. Knowing the processes of hyperon decay the author could easily estimate the cross sections of the above baryon interactions  $\sigma \approx 10^{-40} \text{ cm}^2$ . A beam of  $10^{11}$  particles per sec produces on a 1 m long liquid-hydrogen target one  $p + p \rightarrow p + \Sigma^+$  event per minute if neutral baryon currents exist. and  
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Neutral baryon currents and...

3 01 102 142 141 140 139  
3114 3113

one event every three to four hours if there are no neutral baryon currents. If experiments should yield a  $\sigma \leq 10^{-40} \text{ cm}^2$  they would be a proof of the assumption that neutral baryon currents do not exist. B. N. Valuyev is thanked for discussions. There are 3 references: 1 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: R. Feynman, M. Gell-Mann Phys. Rev., 102, 1956; L. B. Okun', Proc. of the 1960 Ann. Int. Conf. on High Energy Phys. of Rochester, Univ. of Rochester, 1960.

ASSOCIATION: Ob'yedinenyy Institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED August 12, 1961

Card 2/2

MARKOV, M.A.

[Neutrino]Neitrino. Dubna, Ob"edinennyyi in-t iadernykh  
issledovani, 1963. 100 p. (MIRA 16:6)  
(Neutrinos)

L 45658-65 ENT(m)/T/EWA(m)-2

ACCESSION NR: AK5009833

UA/0367/65/001/002/0303/0308

AUTHOR: Zheleznykh, I. M.; Markov, M. A.

TITLE: On a possibility of detecting an intermediate meson with a mass larger than two nucleon masses

SOURCE: Yadernaya fizika, v. 1, no. 2, 1965, 303-308

TOPIC TAGS: intermediate meson, vector meson, hadron, baryon, reaction cross section, lepton, muon, neutrino

ABSTRACT: It is pointed out that the cross section for neutrino reactions aimed at detecting the W mesons decreases with increasing W-meson mass, so that it is expedient to discuss other possibilities for the detection of this meson besides the neutrino experiment. In particular, if the intermediate-boson mass exceeds the mass of two baryons, decays of the type  $W \rightarrow p + n$ ,  $W \rightarrow \bar{p} + \bar{n}$ , and other reaction channels become possible. The reactions considered in detail are resonant reactions of the type  $\bar{N} + N \rightarrow W \rightarrow \bar{a} + b$ , where a and b can be various spinor or vector particles, and the decays of the W meson into a isobar-antibaryon,

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L 45658-65

ACCESSION NR: AP5009833

isobar-antinucleon, and antisisobar-nucleon pairs. The theoretical and experimental data necessary to calculate the reaction cross sections are discussed. It is shown that if  $a$  and  $b$  are hadrons, then account must be taken of the interference between the resonance amplitude and the imaginary part of the amplitude of the strong interaction. The cross sections at maximum of the resonance reactions, for the case when leptons (muon and neutrino) are produced in the final state, are estimated to range from  $10^{-28}$  to  $10^{-30}$  cm<sup>2</sup> when the  $W$ -meson mass ranges from 2 to 10 GeV. "The authors thank A. A. Komar for useful discussions." Orig. art. has: 27 formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences SSSR)

SUBMITTED: 02Sep64

ENCL: 00

SUB CODE: NP

NR REF SOV: 001

OTHER: 007

Card 2/2

ACC NR: AP7004545

SOURCE CODE: UR/0056/66/051/003/0878/0890

AUTHOR: Markov, M. A.ORG: Joint Institute for Nuclear Research (Ob'yedinennyy institut yadernykh issledovaniy)TITLE: Elementary particles with largest masses (quarks and maximons)

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 3, 1966, 878-890

TOPIC TAGS: field theory, elementary particle

ABSTRACT: In field theory which includes gravitation expressions appear (in quantum as well as in the classical region) for the characteristic masses:  $m_0 = (hc/\kappa)^2$ ,  $m_1 = e/\kappa^2$ . An attempt is made to consider these masses as the largest possible ones for elementary particles (maximons). A remarkable property of these mass values is that only for these values does a peculiar mechanism arise (small mass gravitational collapse) which makes possible the formation of arbitrarily small mass systems from the maximons. The peculiar properties of the particles and their relation to quarks are discussed.

Orig. art. has: 26 formulas. [JPRS: 38,695]

SUB CODE: 20 / SUBM DATE: 01Apr66 / ORIG REF: 006 / OTH REF: 009

Card 1/1

DASHEVSKIY, I.I.; MARKOV, M.G.; SAMOKHVALOV, Ya.A., inzhener, redaktor;  
RUDENSKIY, Ya.V., ~~tekhnicheskiy~~ redaktor

[Making cutting tools one tooth at a time] Izgotovlenie rez'-  
bovogo instrumenta cherez shag. Kiev, Gos. nauchno-tekhn. izd-vo  
mashinostroitel'noi lit-ry, 1954. 50 p. (MLRA 8:?)  
(Cutting tools) (Grinding and polishing)

SERGEYEV, A.V.; MARKOV, M.G.; BRUDNOY, G.A., inzhener.

Cutting tool with no-slot chip breakers. Vest. mash. 36 no.6:  
36-38 Je '56. (MLRA 9:10)

(Cutting tools)

MARKOV, M.G.

Concerning L.V.Eirish's article "New data on the Pre-Cambrian and  
Paleozoic in the southern part of the Lesser Khingan Mountains."  
Sov.geol. 5 no.3:160-161 Mr '61. (MIRA 15:4)

1. Geologicheskii institut AN SSSR.  
(Khimang Mountains-Geology)  
(Eirish, L.V.)



AUTHOR: Markov, M.I.

3-7-18/29

TITLE: More Responsibility for Safety Techniques in Vuzes (Bol'she  
otvetsavennosti za tekhniku bezopasnosti v vuzakh)

PERIODICAL: Vestnik Vysshey Shkoly, 1957, # 7, pp 65 - 68 (USSR)

ABSTRACT: The author states the fact that the vuz laboratories have  
been systematically outfitted with the modern equipment, some  
of them, such as the thermal power plant of the Moscow Insti-  
tute of Energetics (Moskovskiy energeticheskiy institut), the  
casting laboratories of the MVTU imeni Bauman, the Moscow  
Institute of Aviation (Moskovskiy aviatsionnyy institut) and  
others have also large, industrial-type machines.

Research by chemical reagents and radioactive isotopes is  
being carried out by vuzes on a large scale. This development  
of educational and scientific work entails the necessity for  
safety measures and industrial sanitation.

During the past years the Ministry of Higher Education and  
the Central Committee of Professional Unions issued various  
instructions on this subject. Large sums of money were spent  
for this purpose: 21 vuzes received 500,000 rubles for the  
reconstruction of ventilation, isotope storage and other safe-

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More Responsibility for Safety Techniques in Vuzes

3-7-18/29

ty measures. The author states that it may be assumed that provisions for the safeguarding of labor do exist in the vuzes, but nevertheless inspections have shown that there are serious deficiencies in this field, in particular in ventilation. The author then enumerates various institutes and laboratories where there is no or insufficient ventilation, such as the Moscow Technological Institute of Food Industry (Moskovskiy tekhnologicheskiy institut pishchevoy promyshlennosti), the Moscow Institute of Chemical Machine Building (Moskovskiy institut khimicheskogo mashinostroyeniya), the Leningrad Academy of Forestry (Leningradskaya lesotekhnicheskaya akademiya), the Institute of Textiles (Leningradskiy tekstil'nyy institut), and others. Often educational and research work begins before ventilation equipment is installed. Insufficient safety measures exist in electric power plants of many vuzes (wrong disposition of current-distributing arrangements, machines and machine tools working under high tension often are not grounded as prescribed by regulations). Safety enclosures around machine tools are often missing, as well as protections around gas containers. There are also unfavorable temperature and humidity conditions in some rooms, while some chemical store-rooms

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More Responsibility for Safety Techniques in Vuzes

3-7-18/29

are improperly outfitted. Very often safety measures during laboratory work with poisonous materials are not sufficiently observed. The author indicates as an example of inadmissible safety conditions at the Leningrad Academy of Technical Forestry, where already in 1955 the Ministry of Higher Education had observed serious defects, which by 1957 had not only not been corrected, but on the contrary were even worse.

It is not always expedient to blame the vuz heads for such conditions as adequate safety measures are often prevented by the untimely supply of ventilators, electric motors, pipes, and other materials. This must be improved as soon as possible.

The Ministry of Higher Education does not deal with this matter as necessary: only 8% of the funds assigned for safety purposes were utilized in 1955, and only 83% in 1956.

The author points out that the Capital Construction Office of the Ministry of Higher Education, the vuz heads and the teachers of the chairs for safety engineering must unite to improve conditions. He also suggests periodic conferences on this subject, as man and his health are the most precious valued in the Soviet Union.

AVAILABLE:  
Card 3/3

Library of Congress

MARKOV, M.I.

86-9-16/36

**AUTHOR:** Markov, M.I., Sr. Eng. Lt.

**TITLE:** Aerial Photography from Low Altitudes (Vozdushnoye  
fotografirovaniye s malykh vysot)

**PERIODICAL:** Vestnik Vozdushnogo Flota, Nr 9, 1957, pp. 47-50 (USSR)

**ABSTRACT:**

The author states that the flying personnel must be trained in taking aerial photographs from a minimum possible altitude of the clouds. In order to execute a photographic mission at low altitudes in Il-28 reconnaissance aircraft, a number of variants for the arrangement of aerial cameras are foreseen and several methods of aerial photography are worked out. According to the adopted methods, the photographic reconnaissance at low altitudes should be carried out by taking vertical photographs or by the use of AKAFY camera mount which automatically changes the camera position. The adopted methods of aerial photography from low altitudes do not permit to carry out the photographic reconnaissance when the clouds are at a low altitude. Therefore, in order to solve this problem, the author together with other photo specialists tested a method of taking aerial photographs by the double coverage of the ground from a minimum possible altitude.

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86-9-16/36

# Aerial Photography from Low Altitudes (Cont.)

For this purpose, the coupled aerial cameras and the AKAFY mechanism were used. To take aerial photographs from low altitudes with three AFA-33/50 m aerial cameras, the adjustable dog of YP-7M mechanism must be set: on the first AKAFY camera mount at  $13^{\circ}$  and on the second AKAFY at  $17^{\circ}30'$ . The oblique AFA-33/50 m aerial camera should be installed at an angle of  $45^{\circ}$ . Such a combination of three serial cameras provides a sidelap between photographs taken with the first and the second AKAFY camera mounts at  $4^{\circ}$  and between photographs taken with the second AKAFY and the oblique aerial camera at  $6^{\circ}$ . The angle of total ground coverage is  $92^{\circ}$  (see Fig. 1). The minimum altitude at which aerial photographs can be taken at the flight speed of 600 km/hour is 800 m. Such an arrangement of aerial cameras permits to take aerial photographs from low altitudes in a straight and level flight, as well as during a turn by the use of "triple sheaf" method. Further, the author states that after making simple changes in the electric wiring system of AFA-33 aerial cameras and of AKAFY mechanism, the aerial photographs of two-photographic strips can be taken from low altitudes with the coupled aerial

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Aerial Photography from Low Altitudes (Cont.)

cameras (AFA-33/75 m, AFA-33/100 m, or AFA-33/20 m). Such an electric wiring diagram of the AFA-33 aerial camera (after the simple changes) is shown in Figure 2. The order in which these changes should be made is described. An area covered by the oblique aerial photographs taken with the AFA-33/75 m coupled aerial cameras is shown in Figure 3. The author ends his article by stating that photo specialists Sr. Technicians Lts. M.A. Radaykin and N.I. Kachurin, Pvts. I.V. Michurin and Yu.S. Obuzdin, and others participated in the development of the above described methods of aerial photography from low altitudes. The article contains 3 Figures.

AVAILABLE: Library of Congress.

Card 3/3

KRAVCHUK, E.; MARKOV, M. I.

Take up photography. Sov.shakht. 10 no.4:45-46 Ap '61.  
(MIRA 14:9)  
(Photography)

MARKOV, M.K.; LIVENTSOV, A.V.; MERSON, YA.I.; SHAMILEV, M.R.

"An investigation of the angular distribution of terrestrial heat radiation by geophysical rockets."

Report presented at the 5th Conference on Atmospheric Optics and Actinometry,  
Moscow, 24-29 June 1963





МАРКОВ, М.М.

MARKOV, M.M.

Water supply for stations making bore studies of structural  
geology. Neftianik 2 no.10:4-6 0 '57. (MIRA 10:12)

1. Starshiy inzhener po bureniyu Sterlitamakskoy geologo-poiskovoy  
kontory tresta Bashvostoknefterazvedka.  
(Water supply, Rural) (Boring)

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24.6600

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S/056/60/038/02/06/061  
B006/B011

AUTHORS: Perfilov, N. A., Ivanova, N. S., Lozhkin, O. V.,  
Makarov, M. M., Ostroumov, V. I., Solov'yeva, Z. I.,  
Shamov, V. P.

TITLE: Fragmentation<sup>17</sup> of Ag and Br Nuclei at Proton Energies of  
9 Bev

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 38, No. 2, pp. 345 - 350

TEXT: The authors of the paper under review offer the first results obtained from their investigation of Ag and Br fragmentation (nuclear disintegration in multicharged particles with  $Z \geq 4$ ) by 9-Bev protons. Small emulsion chambers consisting of ten layers of the  $\pi$ -P (P-R) emulsion (200 $\mu$  thick) were irradiated on the proton synchrotron of the OIYaI (Joint Institute of Nuclear Research) with a 9-Bev proton beam. The individual layers were numbered by a method by V. M. Sidorov and M. I. Trukhin. In the interpretation of the emulsions, such nuclear disintegrations were selected as contained tracks of particles with  $Z \geq 4$ .

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Fragmentation of Ag and Br Nuclei at Proton  
Energies of 9 Bev

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S/056/60/038/02/06/061  
B006/B011

Depending on the proton energy, the disintegrations were divided into "black" ( $E_p < 30$  Mev), "gray" ( $E_p \leq 1$  Bev), and "thin" ( $E_p > 1$  Bev) ones. For the charge determination, the integral track width was determined with an ocular micrometer. On interpreting the results, the authors found 1,028 disintegrations with four or more prongs each; among them were, as an analysis revealed, 188 ordinary ones having fragments with  $Z \geq 4$ . Further 709 events were established, in which such fragments occurred, that is a total of 997 disintegrations having fragments with  $Z \geq 4$  [Abstracter's Note: One of the above figures must be wrong, since  $188 + 709 = 897$ ]. The experimental results are described in detail. a) Characterization of nuclear disintegrations with fragments. A table specifies the average prong numbers for the individual star types. The average number of particles is considerably higher in disintegrations with fragments than it is in ordinary disintegrations, especially in disintegrations with several fragments and in such with fast fragments (range  $> 100 \mu$ ). b) Production cross section of stars with fragments. For stars having fragments with  $Z \geq 4$  in Ag- and Br disintegrations it was found to be  $100 \pm 30$  mb, viz.

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Fragmentation of Ag and Br Nuclei at Proton  
Energies of 9 Bev

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B006/B011

about 10% of the total inelastic interaction cross section. Fig. 2 illustrates the fragmentation cross section as a function of  $E_p$ . In the range of proton energies around 1 Bev there appears a steep climb of the cross section. c) Multiplicity in fragment production. The quantity of stars with two or more tracks of multicharged particles is found to grow with the energy of bombarding protons. At  $E_p = 9$  Bev this relative quantity amounts to 0.2, at 660 Mev 0.05 only. d) Nature of fragments. Fig. 3 shows the charge distribution of the fragments: The number of particles decreases in a practically linear manner with growing charge. The charge distribution differs only little from the one found at lower energies of the bombarding particles. e) Angular and energy distributions of the fragments. Their angular distribution was determined by a method by V. I. Ostroumov and R. A. Pilov; it is illustrated in Fig. 4 with respect to the proton direction of incidence (for events with one fragment, with fast fragments, and with two or more fragments). Distribution becomes more anisotropic with increasing fragment energy. The forward-backward ratio is  $3.6 \pm 1.1$  at  $R > 100 \mu$ . The angular distribution is less anisotropic at  $E_p = 9$  Bev with respect to the proton direc-

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Fragmentation of Ag and Br Nuclei at Proton  
Energies of 9 Bev

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B006/B011

tion than it is at  $E_p < 1$  Bev. The three diagrams of Fig. 6 show the energy distribution for particles with the charges 4, 5, and 6. It is only little dependent on  $E_p$  (cf. Fig. 7). f) Hyperfragment production.

Three cases of a hyperfragment production (one of them with a charge equal to 6) were recorded among the 997 fragmentation events. The authors finally thank the team of the laboratoriya vysokikh energiy Ob'yedinennogo instituta yadernykh issledovaniy (High-energy Laboratory of the Joint Institute of Nuclear Research) for assistance given in the irradiation of the emulsion chambers. There are 7 figures, 1 table, and 9 references: 8 Soviet and 1 Japanese.

ASSOCIATION: Radiyevyy institut Akademii nauk SSSR (Radium Institute of the Academy of Sciences, USSR)

SUBMITTED: August 1, 1959

Card 4/4

83718

S/056, '60/038, '004/011, '048  
B019, B070

24.6600

AUTHORS:

Arifkhanov, U. R., Makarov, M. M., Perfilov, N. A.,  
Shamov, V. P.

TITLE:

Production of Fragments Under the Action of 100-Mev Protons

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 38, No. 4, pp. 1115-1122

TEXT: The authors have investigated the fragment production of the nuclei of a photoemulsion. The emulsion used was of type П-9 (γ) (P-9 (ch)), which allowed the observation of the charged products of nuclear fragmentations, and a visual study of the multiply charged particles with  $Z \geq 3$ , of α particles, or protons. The experiments were carried out at the synchrocyclotron of the OIYaI (Joint Institute of Nuclear Research). Fig. 1 shows the experimentally observed fragment production cross section as function of the photon energies for heavy and light nuclei. Fig. 2 shows the reduced probability for the departure of fragments from a heavy nucleus as a function of the number of prongs of a star. In the fragmentation of Ag and Br, the following fragments

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Production of Fragments Under the Action  
of 100-Mev Protons

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S/056/60/038/004/011/025  
B019/B070

were found: Li (30), Be (14), and B (5). In the fragmentation of C, N, and O the following fragments were found: Li (20), Be (12), and B (5). Fig. 3 shows the energy distribution of the Li and Be fragments for heavy and light nuclei; Fig. 4 shows the distribution of the fragments according to their range, and Fig. 5 shows the angular distributions of the fragments. The fragmentation cross section for the heavy nuclei of the emulsion is given to be  $1.93 \pm 0.64$  millibarns and of the light nuclei  $1.16 \pm 0.36$  millibarns. The results of O. V. Lozhkin and N. A. Perfilov (Ref. 6) and M. G. Meshcheryakov (Ref. 14) among others are also mentioned. From the discussion of the results the authors conclude that for the energy range of the incident protons ( $\sim 100$  Mev) investigated here the fragments of secondary nucleons are formed by quasi-elastic scattering on moving nucleon complexes. There are 8 figures, 1 table, and 18 references: 7 Soviet, 8 US, 1 Japanese, 1 French, and 1 German. X

ASSOCIATION: Radiyevyy institut Akademii nauk SSSR (Radium Institute of the Academy of Sciences, USSR)

SUBMITTED: November 26, 1959

Card 2/2



MARKOV, M. N.

235T102

USSR/Physics - Infrared Spectrometer 11 Sep 52

"Automatic Infrared Spectrometer," V. I. Malyshev,  
M. N. Markov, A. A. Shubin

"Dok Ak Nauk SSSR" Vol 86, No 2, pp 273-276

Discusses the familiar difficulty of rapid and accurate measurements of coeff of absorption in the infrared region. Describes the block scheme of subject automatic infrared spectrometer, which is convenient for quant and qual analysis when combined with the use of a graduated curve obtained according to standard mixts. Recording time was 30 min in the case of nitrobenzol and polystyrol. Submitted by Acad G. S. Landsberg  
16 Jun 52.

235T102

(CA 47 no. 14: 6769 '53)

MARKOV, M. N.

Chemical Abstracts  
May 25, 1954  
Electronic Phenomena  
and Spectra

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0  
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A double-beam infrared spectrophotometer. V. I. Malyshev, M. N. Kov, and A. A. Shubin. Izvest. Akad. Nauk S.S.S.R., Ser. Fiz. 17, 854 (1953); cf. C.A. 47, 6769h. — A spectrometer is described in which the measurements are made by means of an absorbing wedge on the calibration beam. A feature of this automatic spectrophotometer is the amplifier in which the main amplification is made at a frequency of 4000 cycles and a wide band and the remainder on a narrow 9-cycle band. The bridge has a 4000-cycle voltage, and the light on the bolometer is interrupted at a frequency of 9 cycles. The total amplification is  $10^4$ , the noise level  $10^{-3}$  v., and the min. detected radiation  $6 \times 10^{-9}$  w. The spectrum 2.5-16  $\mu$  is registered in 30, 60, or 120'. The intensity of the diffused radiation is cut down with a MgO filter to 1%. The spectrum of polystyrene on a double-beam spectrometer is compared to the same spectrum on a single-beam set up. S. Paksas.

Phys. Inst. im. Lebedev, AS USSR

MARKOV, M. N.

USSR/Physics - Infrared spectrophotometry

FD-1081

Card 1/1      Pub. 153 - 17/24

Author        : Markov, M. N.

Title         : Amplifier equipment for infrared spectrophotometry for amplifying the  
                 bolometer voltage in measurements of low-intensity infrared radiation

Periodical    : Zhur. tekhn. fiz., 24, No 10, 1867-1875, Oct 1954

Abstract      : Minimum measurable voltage is  $2 \cdot 10^{-9}$  volt, corresponding to a radiation  
                 flux of  $6 \cdot 10^{-9}$  watt; the amplifier time constants are  $1/4$ ,  $1/2$ , 1 and  
                 2 seconds. The author remarks that interference is eliminated to a very  
                 large extent by amplification of the 9 cycle signal on a 4 kc carrier  
                 and by special screening and high stability of the supply source. The  
                 described amplifying equipment is used in USSR-designed automatic spec-  
                 tro-photometers with output fed to a 13-watt servo system and also in  
                 single-beam infrared spectrometers. According to the author's experience  
                 the equipment can be operated without additional adjustment for one day.  
                 The operating personnel need not have much electronics knowledge.

Institution   : -

Submitted     : November 1, 1953

MARKOV, M. N.

27 27 3  
Bolometers made from a bismuth-lead alloy. M. N. 4E2C  
Markov. *Soviet Phys. "Doklady"* 1, 317-20 (1956) (English  
translation).—See C.A. 51, 7131h. R. M. R.

for  
conf

MARKOV, M.N.

Measuring low-frequency current noises generated by low-resistance sources. Prib.i tekhn.eksp.no.3:70-73 E-D '56. (MLBA 10:2)

1. Fizicheskiy institut im.P.N.Lebedeva AN SSSR.  
(Electron-tube circuits--Noise)

CARD 1 / 2

PA - 1335

SUBJECT USSR / PHYSICS  
 AUTHOR MARKOV, M.N.  
 TITLE Bolometers made of an Alloy of Bismuth and Lead.  
 PERIODICAL Dokl. Akad. Nauk, 108, fasc. 3, 428-431 (1956)  
 Issued: 8 / 1956 reviewed: 10 / 1956

Bolometers may more easily be produced by steaming-on in the vacuum, but such bolometers were found to be less sensitive than others produced by a more complicated method. For the purpose of improving bolometers produced by evaporation the bismuth bolometers F-1 used in the automatic infrared spectrometer of the Physical Institute of the Academy of Science were investigated. At first an expression for the threshold of the sensitivity of the bolometer is given; the first term of this expression is due to the temperature fluctuations of the bolometer stripe, the second by the so-called "JOHNSON" noise. With most thermal light receivers at present in use, the second term is from 5 to 10 times as large as the first. If the receiver has an additional noise (e.g. "current noises" resulting from various disturbances etc.), the formula contains a further number of terms. Among other things the present work investigates the problem as to how this additional noise may be reduced to a minimum. In the case of bismuth the sign and the absolute amount of the temperature coefficient of the resistance depend on slight ( $\sim 0,1\%$ ) admixtures of Pb, Sn and other metals. On the other hand  $\beta < 0$  is only half as large in the case of thin steamed-on layers than with massive bismuth. Besides,  $\beta$  depends on the thickness of the steamed-on layer. On the occasion of the steaming-on bismuth is purified

Translation 9002986

10/10/57, M.N.

PRIKHOT'KO, A F

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PHASE I BOOK EXPLOITATION SOV/1365

L'vov. Universitet

Materialy I Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies printed. (Series: Its: Fizichnyy zbirnyk, vvp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Jaker, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Lavitsberg, G.S., Academician (Resp. Ed., Deceased), Neporent, B.S., Doctor of Physical and Mathematical Sciences, Pabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Pablikov, V.A., Doctor of Physical and Mathematical Sciences, Koritskiy, V.G., Candidate of Technical Sciences, Raynskiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., A. Ye., Candidate of Physical and Mathematical Sciences.

Card 1/30

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MARKOV, M. N. Cand Tech Sci -- (diss) "Study of spray bolometers of ~~small~~ <sup>low</sup> inertia." Mos, 1957. 16 pp (Acad Sci USSR. Physics Inst im P. N. Lebedev), 135 copies. Bibliography at end of text (12 titles) (KL, 6-58, 101)



MARKOV, M. N.

AUTHOR: Markov, M.N.

51-2-7/15

TITLE: Comparison of low-inertia detectors of infrared radiation.  
(O sravnenii maloinertsionnykh priyemnikov infrakrasnogo izlucheniya)

PERIODICAL: "Optika i Spektroskopiya" (Optic and Spectroscopy)  
1957, Vol.3, No.2, pp.158-161 (U.S.S.R.)

ABSTRACT: R.C.Jones (Ref.1-3) was the first to compare various i.r. detectors. The author follows Jones' method in general but modifies it somewhat in details. As the principal criterion of quality of infrared receivers (including photo-resistors) their threshold sensitivity  $Q_{min}^1$  is used. This is measured under the following conditions:- (1) the receiver is illuminated with light square-modulated at a frequency not less than 5 c/s (i.e. only the low-inertia receivers are considered in this paper); (2) a narrow-band amplifier is used, with a pass-band sufficient for isolation of the first harmonic of the signal; at the amplifier output a two-half-period rectifier with an integrating element is used; the noise band-width of the whole apparatus is 0.25 c/s (time constant of 1 second); (3) the threshold sensitivity is taken to be the light flux which causes a current equal to the root-mean-square of the receiver noise. The author's criterion,  $Q_{min}^1$ , and the Jones criterion,  $H_m$ , are related by Eq.2.

Card 1/2

51-2-7/15

Comparison of low-inertia detectors of infra-red radiation.  
(Cont.)

$$Q_{\min.1} \approx H_m \sqrt{F \tau} \frac{\pi}{\sqrt{2}} \quad (2)$$

where  $F$  = the receiver area in  $\text{mm}^2$  and  $\tau$  = the receiver time constant. A table gives values of  $\tau$  in msec,  $S_0$  (which is the conversion coefficient) in volts per watt,  $F$  in  $\text{mm}^2$ ,  $H_m$  and  $Q_{\min.1}$  both in  $10^{-10}$  watt, for 16 receivers of which only one (No.9) is Russian. This group of 16 includes two U.S.A. superconducting bolometers (Ref.8), two U.S.A. semiconducting bolometers (Ref.2), five metal bolometers (four from U.S.A.-Ref.2, and one Russian-Ref.15), four thermocouples (two from U.S.A.-Refs. 2, 9, one from Britain - Ref.10 and one German - Ref.11), one U.S.A. pneumatic detector (Ref.12) and British two photoresistors (Refs.13, 14). The values of  $\tau$  for various detectors are between 0.04 and 50 msec,  $S_0 = 1.6-730$  volts per watt,  $F = 0.4-100 \text{ mm}^2$ ,  $H_m = 0.216-210$ ,  $Q_{\min.1} = 0.06-150$ . There are 1 table and 16 references (2 of which are Slavic). References cited: 1-3, 8-15.

Card 2/2

SUBMITTED : October 25, 1956.

ASSOCIATION: Lebedev Physics Institute, Academy of Sciences of the  
U.S.S.R.

AVAILABLE: Library of Congress

MARKOV, M.N.; LINDSTREM, I.S.

Specific resistance of bismuth dust films. Fiz.tver.tela 1 no.5:  
827-828 My '59. (MIRA 12:4)

1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR.  
(Bismuth--Electric properties)

AUTHORS: Markov, M.N. and Lindstrom, I.S.

SOV/51-7-3-10/21

TITLE: Optical Properties of Evaporated Bismuth in the 3-15 Micron Spectral Region

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 3, pp 349-354 (USSR)

ABSTRACT: Optical properties (refractive index, absorption factor, reflection and transmission coefficients) of vacuum-deposited bismuth layers were studied in the 3-15  $\mu$  spectral region. The layers had thicknesses between 0.1 and 1.0  $\mu$ . In this range of thicknesses the density is practically the same as the density of massive samples and both the resistivity and the temperature coefficient of resistance are practically independent of the layer thickness. The layers were prepared by evaporation from tantalum ribbons, heated to 700°C in a vacuum of  $10^{-5}$  mm Hg. The layers were deposited on glass, rock-salt and nitrocellulose bases. Bismuth used for evaporation had less than 0.01% impurities by weight. In the process of evaporation bismuth was purified and the amount of impurities fell to about 0.001%. The layers were fairly transparent in the infrared region and produced clear interference patterns. Transmission spectra (samples deposited on rock-salt) and

Card 1/3

JCO/51-7-3-10/21

## Optical Properties of Evaporated Bismuth in the 3-15 Micron Spectral Region

reflection spectra (samples deposited on rock-salt, glass and nitro-cellulose) were recorded by means of a two-beam infrared spectrometer MIRS-F4 (Ref 4) which is shown schematically in Fig 1. The refractive index was determined from these spectra using the distribution of the interference maxima and minima, and thickness of the layer measured independently. The absorption factor  $\alpha$  was calculated from the measured values of the refractive index ( $n$ ), thickness ( $d$ ) and the reflection and transmission coefficients, denoted by  $R$  and  $T$  respectively. The error in determination of the refractive index was 6-8% and in determination of the absorption factor it was 20-30%. The values of  $n$  and  $\alpha$  of layers deposited on glass, rock-salt and nitrocellulose were practically identical. The thickness of layers was measured using a multibeam interferometric method; the apparatus was similar to that described by Scott et al (Ref 4). The thickness was measured to within 3-5%. Fig 2 shows the reflection ( $R$ ) and transmission ( $T$ ) spectra of samples (1) 0.22, (2) 0.56 and (3) 0.89  $\mu$  thick. Fig 3 shows the wavelength dependence of the refractive index of layers 0.22, 0.69 and 0.89  $\mu$  thickness (curves 1, 2, 3, respectively). The refractive index of thin layers (curve 1 in Fig 3) increases with decrease of wavelength, while the refractive index of thick layers (curve 3 in Fig 3) has a maximum near 7  $\mu$ . The curve representing layers of medium thickness (0.5-0.7  $\mu$ )

Card 2/3

SOV/51-7-3-10/21

Optical Properties of Evaporated Bismuth in the 3-15 Micron Spectral Region

lies between curves 1 and 3. Fig 4 shows the wavelength dependence of the absorption factor  $\chi$  of 0.12, 0.56 and 0.69  $\mu$  thickness. This figure shows that at wavelengths from 3 to 15  $\mu$  the  $\chi$  vs  $\lambda$  dependence is approximately the same for layers of all thicknesses, a minimum at 7.5  $\mu$  was observed. Fig 5 shows the wavelength dependence of the refractive index of a 0.9  $\mu$  thick layer at +200°C (curve 1), +100°C (curve 2), and -90°C (curve 3). This figure shows that on lowering of temperature the maximum on the refractive index curve is displaced towards longer wavelengths and the value of  $n$  at its maximum falls. Acknowledgments are made to V.I. Malyshev and S.S. Rautian for their advice. There are 5 figures and 14 references, 6 of which are Soviet, 6 English, 1 German and 1 translation from English into Russian.

SUBMITTED: December 20, 1958

Art 3/3

1948 I 800, 800, 800, 800

Isaiahovskiy po sovremennym problemam teorii funktsii kompleksnogo peremennogo (Investigation of Modern Problems in the Theory of Functions of a Complex Variable). Collection of Articles. Moscow, Nauka, 1977. 3,000 copies printed.

MA. (with pref.) A. I. Markovskiy. (with pref.) V. I. ...  
A. N. ...

... This book is intended for specialists in the theory of functions of a complex variable. It may also be useful to a wider circle of scientific workers, and specialists in other fields of mathematics.

CONTENTS: The book contains 13 papers originally presented at the Conference on the Theory of Functions of a Complex Variable, held at the University from May 28 to June 1, 1977. The papers are divided into 7 parts. The first part contains the general theory of functions, boundary and extremal problems. The second part contains papers on series, boundary and extremal problems. The third part contains papers on functions and interpolation and approximation problems. The fourth part discusses functions of many complex variables. The fifth part contains papers on conformal mappings and boundary-value problems. The sixth part contains papers on the theory of functions of a complex variable. The seventh part contains papers on the theory of functions of a complex variable.

... (with pref.) L. I. (Perev.). ...  
... (with pref.) A. A. (Perev.). ...  
... (with pref.) S. (Bachurav). ...  
... (with pref.) A. I. (Perev.). ...

... (with pref.) V. G. (Perev.). ...  
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... (with pref.) V. I. (Perev.). ...

MARKOV, M.N.; KHAYKIN, A.S.

Optical properties of massive bismuth in the 3-36  $\mu$  region of the  
spectrum. Opt. i spektr. 9 no. 4:487-492 0 '60. (MIRA 13:11)  
(Bismuth--Optical properties)



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26.1512

83926

S/051/60/009/004/028/034  
E201/E191

AUTHORS: Markov, M.N., and Kruglyakov, E.P.

TITLE: Zonal Sensitivity of PbS Photoresistors 71

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, No 4, pp 538-540

TEXT: The authors investigated zonal sensitivity of PbS photoresistors of CA-1 (FSA-1) type; by zonal sensitivity the authors mean variations of sensitivity across a sample. Samples were illuminated with an incandescent lamp and the resultant photoconductivity signal was amplified and measured with a tube voltmeter ЛБ-9М (LV-9M) and an automatic potentiometer ЭП-09 (EPP-09) connected in parallel with the voltmeter. It was found that, as one went across a sample, there were numerous photosensitivity peaks and "valleys" distributed randomly across the sample surface. The photoresistors studied by the authors (35 samples) could be divided into two approximately equal groups. Those of the first group (Fig 1) had sharp sensitivity maxima mostly in the contact (electrode) regions. In some samples of this group the magnitudes of the maxima depended on the polarity of the applied voltage. In the photoresistors of the second group the numerous maxima were not concentrated in the contact regions

Card 1/2

83926  
S/051/60/009/004/028/034  
E201/E191

# Zonal Sensitivity of PbS Photoresistors

(Fig 2). The sensitivities of the first and second group samples were the same when whole samples were illuminated. Figs 1 and 2 represent results obtained with a circular light spot of about 30  $\mu$  diameter; the results obtained with a larger rectangular spot (0.1 x 4 mm) gave a smoother distribution of the photo-sensitivity for the first group (Fig 3), with peaks near the contacts. At the contacts the sensitivity was about three times higher (and the sensitivity threshold about three times lower) than in the middle of PbS samples. A further lowering of the sensitivity threshold could be obtained by taking the signal from the illuminated region only and not from the whole sample. The photosensitivity peaks occurred at grain boundaries and were accompanied by higher local resistivities (a table on p 539). There are 3 figures, 1 table and 5 references: 1 Soviet and 4 English. ✓

SUBMITTED: April 8, 1960

Card 2/2

21411

S/120/61/000/002/022/042  
E192/E382

9.2520 (also 1139, 1154, 1159, 1161)

AUTHOR: Markov, M.N.

TITLE: A Transistor Input Amplifier for Bolometer Signals

PERIODICAL: Priory i tekhnika eksperimenta, 1961, No. 2.  
pp. 118 - 119

TEXT: Considerable practical difficulties are encountered in securing high-sensitivity with wire bolometers when these are employed in conjunction with an electron-tube amplifier. This is due to the fact that high-inductance transformers with high transformation ratios have to be employed at the input of the amplifiers. It appears that these difficulties can be overcome by using transistors in the first amplifying stage; in this case, it is possible to eliminate the input transformer and lower the noise. However, since the noise-spectrum level of transistors at low frequencies is comparatively high (and the bolometers have to be operated at these low frequencies) it is necessary to employ a special system. In this, the low-frequency spectrum of the signal is shifted into the high-frequency region. For this purpose, the bolometer is connected

Card 1/4

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S/120/61/000/002/022/042  
E192/E382

# A Transistor Input Amplifier ....

into a bridge circuit which is supplied with an alternating voltage having frequencies ranging from 1 to 10 kc/s. The low-frequency signal of the bolometer modulates this frequency so that the amplification takes place at the carrier frequency  $f_H$  in a bandwidth  $\Delta f = 2f_M$ , where  $f_M$  is the modulation frequency. The circuit shown in Fig. 1 is based on this principle; the circuit can be compared with the usual bolometer amplifier, which is illustrated in Fig. 2. The bridge circuit of Fig. 1 has equal arm resistances. The transistor operates as the grounded emitter amplifier and the carrier frequency is 1.85 kc/s, which corresponds to the bolometer time constants of 10 - 20 ms and modulation frequencies of 6 - 15 c.p.s. The output of the transistor amplifier can be connected to the grid of the next amplifying stage. The parameters indicated in Fig. 1 were chosen experimentally in such a way as to obtain an optimum signal/noise ratio at the output of the stage. It should be mentioned that these parameters are not particularly critical. The circuit was compared with the transformer-

Card 2/4

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S/120/61/000/002/022/042  
E192/E382

# A Transistor Input Amplifier ....

coupled amplifier of Fig. 2. It was found that if the signal/noise ratio in the latter was assumed as being equal to unity, this ratio was 0.32 for the transistor type П1А (PiA) and 0.65 for the type П5Д (P5D). It is seen, therefore, that while the noise resistance of the transformer amplifier is  $20 \Omega$ , this resistance is  $115 \Omega$  for the transistor P5D and  $300 \Omega$  for PiA. It is concluded, therefore, that a transistor amplifier can be employed instead of the input transformer without significant reduction in the threshold sensitivity of the bolometer. There are 2 figures and 5 Soviet references.

ASSOCIATION: Fizicheskii Institut AN SSSR (Physics  
Institute of the AS USSR)

SUBMITTED: April 13, 1960

Card 3/4

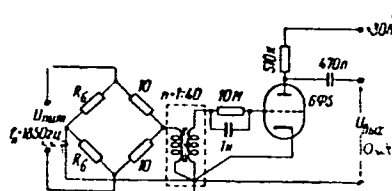
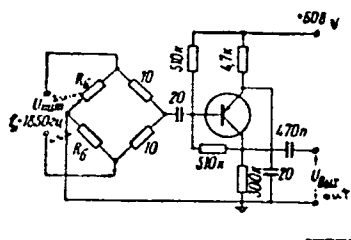
21411

A Transistor Input Amplifier ....

S/120/61/000/002/022/042  
E102/E382

Fig. 1:

Fig. 2:



Card 4/4

44832

S/560/62/000/014/003/011  
A001/A101

3. 600

AUTHORS: Aver'yanov, I. P., Kasatkin, A. M., Liventsov, A. V., Markov, M. N.,  
Merson, Ya. I., Shamilev, M. R., Shervinskiy, V. Ye.

TITLE: The measurement of Earth's thermal radiation into space during the  
total eclipse of February 15, 1961, from an altitude geophysical  
automatic station

SOURCE: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli. no. 14, 1962,  
49 - 56

TEXT: To improve calculational methods of determining radiation of the  
atmosphere at high altitudes, the study of optical properties of its upper  
layers, using the measurements of its thermal radiation, is necessary. These  
studies have been conducted in the USSR since 1958 by means of altitude geophys-  
ical rockets. The article describes one of these experiments performed during  
the total solar eclipse of February 15, 1961, in the middle part of the European  
part of the USSR. The general scheme of the experiment is shown in Figure 1 and  
the block-diagram of the device mounted on an altitude geophysical automatic

Card 1/4

The measurement of Earth's thermal...

S/560/62/000/014/003/011  
A001/A101

station (rocket) is shown in Figure 2. The rocket was lifted to an altitude of about 100 km. During the operation at high altitudes the device performed about 5 cycles of scanning, three of which were satisfactory and were used for processing. The recorder of radiation functions on the differential system of registration; the speed of scanning motion is  $6^\circ$  per one sec.; the threshold of bolometer sensitivity amounts to  $10^{-9}$  w/cps at a frequency of 80 cps; the spectral sensitivity of the bolometers is uniform within the range from 1 to  $40 \mu$ . The mean magnitude of the thermal flux, averaged for the total scanning angle, was determined to amount to  $1.8 \times 10^{-2}$  w.cm $^{-2}$ . The experiment conducted, as well as the previous measurements of the Earth's thermal radiation, is the first attempt of this kind. There are 5 figures.

SUBMITTED: March 10, 1962

Card 2/4

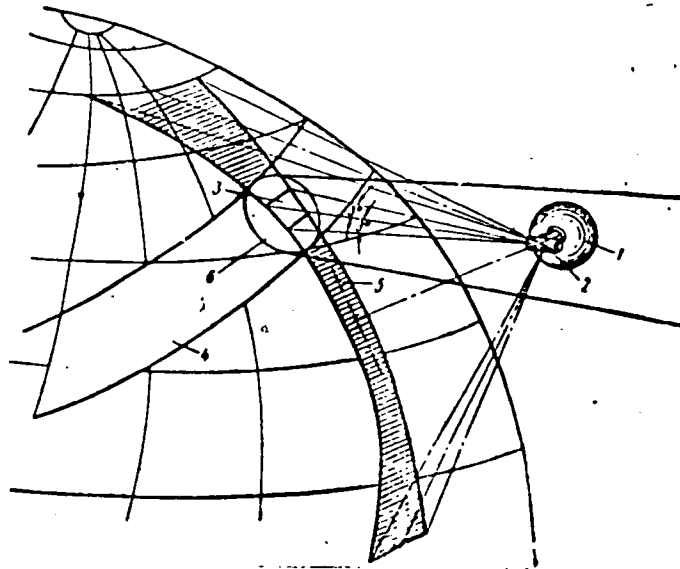


The measurement of Earth's thermal...

S/560/62/000/014/003/011  
A001/A101

Figure 1. The scheme of an experiment

Legend: 1 - Altitude geo-physical automatic station; 2 - recorder of Earth's radiation; 3 - area on the Earth whose radiation is being measured; 4 - belt of total eclipse phase; 5 - band of scanning; 6 - lunar umbra.

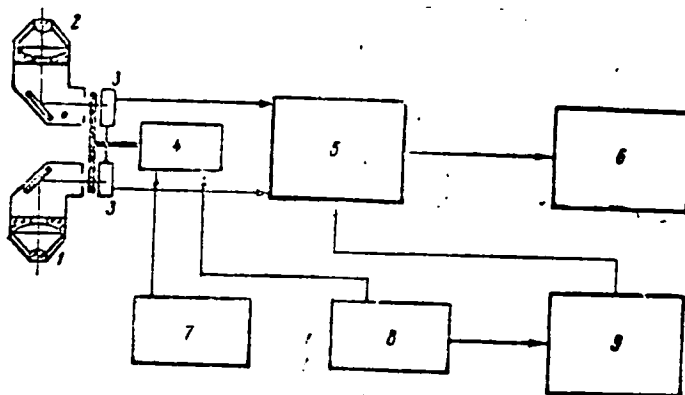


Card 3/4

The measurement of Earth's thermal...

S/560/62/000/014/003/011  
A001/A101

Figure 2. The block-diagram of a device for recording Earth's thermal radiation  
Legend: 1 - scanning optical head; 2 - optical head of zero signal; 3 - bolometers; 4 - mechanism of scanning; 5 - amplifier; 6 - telemeasuring system; 7 - motor supply source; 8 - commanding device on board; 9 - supply source (autonomous).



Card 4/4

10565

3.5110

S/020/62/146/002/006/013  
B142/B186

AUTHORS: Liventsov, A. V., Markov, M. N., Merson, Ya. I., Shamilev, M. R.

TITLE: Experimental determination of outward terrestrial radiation

PERIODICAL: Akademiya nauk SSSR: Doklady, v. 146, no. 2, 1962, 344-346

TEXT: So far only mean values of terrestrial radiation could be calculated for the troposphere and stratosphere, and sometimes the data were unreliable. In view of this, the emissive terrestrial radiation was measured by means of high-altitude sounding rockets at altitudes from 100 to 500 km. A special infrared radiation-measuring device was used. It comprised an optical mirror system for focusing the thermal radiation emitted upward (spectrum range from 2.5 to 40  $\mu$ ) onto a low-inertia bolometer, signal amplifiers, automatic recorders of the magnetic and galvanometric type, and radio-telemetering systems for monitoring the recorded data to Earth. The modulation principle was employed with a frequency of 80 c/sec. Operational difficulties through the spectrum band being close to the modulator band were overcome by differential modulation

Card 1/3

Experimental determination of ...

S/020/62/146/002/006/013  
B142/B186

of heat flux radiation both from the Earth and from cosmic space used as control gauge. During 1958 - 1961 four tests were carried out over specific territorial sections of the central regions in the European part of the USSR at altitudes of 100 km (during the total solar eclipse on February 15, 1961), 200 km (two tests), and 470 km. Data from single territorial sections were obtained by scanning of the lower hemisphere in the optical system. Scanning angle was  $180^\circ$ , scanning intervals were 30 sec. Integral radiation within this wave range was recorded. Solar short-wave radiation was filtered out by frosting the mirrors or by dusting them with PbS. The spatial resolving power of the device was  $0.5^\circ$ . Before testing, the device was calibrated to radiator gauges and the sensitivity was automatically controlled by a special built-in gauge radiator over intervals of 30 sec.  $Q$  and  $T_{eff}$  were calculated according to Lambert's law as numerical values. They were compiled in a table together with comparative data from other authors. Differences in radiation flux due to meteorological factors were observed. Results:

Card 2/3

Experimental determination of ...

S/020/62/146/CO2/CO6/C13  
B142/B186

	Test 1	Test 2	Test 3	Test 4
$Q \text{ w/cm}^2$	$1.2 \cdot 10^{-2}$	$0.9 \cdot 10^{-2}$	$1.4 \cdot 10^{-2}$	$1.8 \cdot 10^{-2}$
$T_{\text{eff}}, K^{\circ}$	216	200	224	238
Conditions	no clouds	medium over- cast	medium over- cast	continuous overcast solar eclipse

Conclusion : it was possible to measure infrared terrestrial radiation over a broad spectrum range ( $40 \mu$ ) in practice. At the same time a new method, has been developed which can be applied both to studies in geophysics and to terrestrial atmosphere research. The mechanical part of the radiation-measuring device was designed by V. Ye. Shervinskiy. There is 1 table.

PRESENTED: April 9, 1962, by A. A. Blagonravov, Academician  
SUBMITTED: March 13, 1962  
Card 3/3

GRIGOR'YEV, A. A.; MARKOV, M. M.

Practice in the agroclimatic regionalization of the Kirghiz  
S.S.R. Izv. Kir. fil. Geog. ob-va SSSR no.3:129-135 '62.  
(MIRA 15:10)

(Kirghizistan—Agriculture and climate)  
(Kirghizistan—Agricultural geography)

MARKOV, M.N.; MERSON, Ya.I.; SHAMILEV, M.R.

Use of geophysical aerostats in studying the stratospheric and  
tropospheric heat radiation fields in the infrared spectral region.  
Kosm. issl. 1 no.2:235-248 S-O '63. (MIRA 17:4)

MARKOV, M.N.; KHOKHLOVA, V.L.; TSUGULIYEV, A.I.

Investigation of the thermal radiation of separate areas of  
the lunar surface in the infrared. Izv. Krym. astrofiz. obser.  
30:284-296 '63. (MIRA 17:1)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR, Krymskaya  
astrofizicheskaya observatoriya AN SSSR i Astronomicheskiy  
sovet AN SSSR.



L 52504-65 EWT(1)/ENG(v)/FCC Pe-5/Pae-2 CS/GM

ACCESSION NR: AT5011154

UR/0000/64/000/000/0044/0050

AUTHOR: Markov, M.N.; Merson, Ya. I.; Shamilev, M.R.

TITLE: Investigation of the angular distribution of the infrared radiation of the earth and its atmosphere from geophysical balloons

SOURCE: Mezhdometstvennoye soveshchaniye po aktinometrii i optike atmosfery 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry, and atmospheric optics); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 44-50

TOPIC TAGS: geophysical balloon, terrestrial infrared radiation, atmospheric infrared radiation, stratosphere, troposphere

ABSTRACT: This paper presents the results of measurements of the angular distribution of terrestrial radiation from geophysical balloons. The primary objective of the study was to determine the total radiation in the lower stratosphere and troposphere. Measurements were made mostly at heights of 25-30 km. Emphasis was on determining the form of angular distribution as a whole, the degree of isotropic distribution and the possibility of detecting meteorological inhomogeneities on the basis of thermal radiation in a broad infrared region of the spectrum (0.8-40  $\mu$ ). Several series of ascents were made in 1960-1961. The block diagram of the recorder is shown in Fig. 1 of the

Card 1/4

L 32504-65

ACCESSION NR: AT5011154

Enclosure. The instrument consists of an optical head, small amplifier, a mechanism for rotating the scanning head and a mechanism for orienting the instrument. Measurements were made in the central zone of the European SSSR. Each ascent yielded the following experimental data: 1. The angular distribution of the intensity of infrared radiation of the earth and atmosphere in the direction of space. 2. A flight barogram. 3. Data from the astrophotographic unit. 4. Photographs of the underlying surface and space in the visible region of the spectrum. Fig. 2 of the Enclosure shows the angular distribution of radiation for several scanning cycles on four flights at different heights (season the same for all flights). Orig. art. has: 5 figures.

ASSOCIATION: Fizichesky institut imeni P.N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 25Nov64

ENCL: 02

SUB CODE: ES

NO REF SCV: 000

OTHER: 000

Card: 2/4

L 52504-63

ACCESSION NR: AT5011154

ENCLOSURE: 01

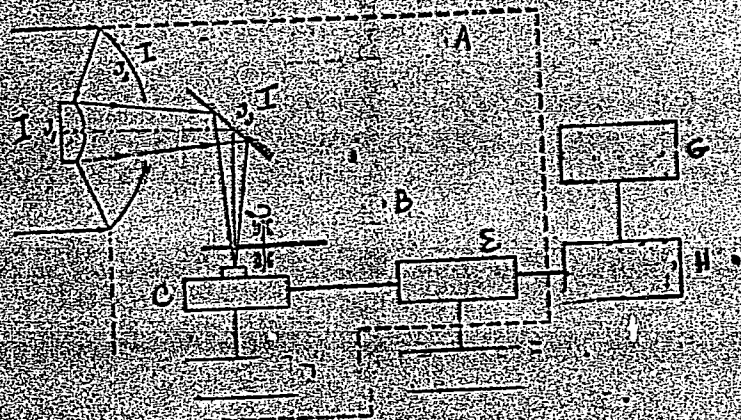


Fig. 1. Block diagram of the recorder. A. Optical head unit; B. Obturator; C. Bolometer; D. Power source (batteries); E. Amplifier; F. Power source (batteries); G. Power source (storage batteries, balloon electrical system); H. Loop oscillograph; I. Mirrors.

Card 3/4

52504-65

ACCESSION NR: AT5011154

ENCLOSURE: 02

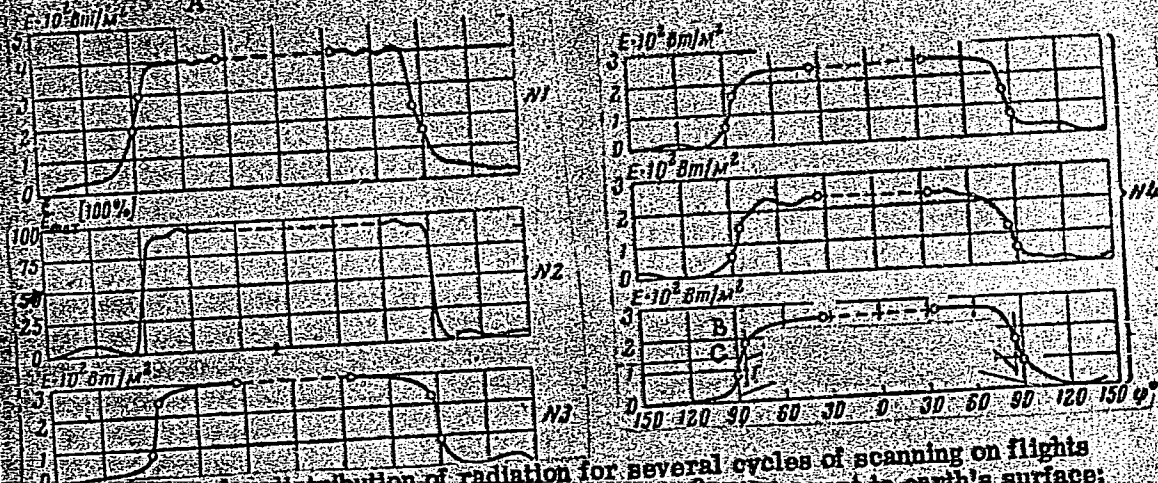


Fig. 2. Angular distribution of radiation for several cycles of scanning on flights Nos. 1-4 obtained from different heights. A)  $W/m^2$ ; B) tangent to earth's surface; C) horizontal direction.

Card 4/4

1. 45735-65 EWG(v)/EWT(1)/EEC(t)/FSS-24 Pe-5/Po-4/Pae-2 GW/GS  
 ACCESSION NR: AT5011155 UR/0000/64/000/000/0051/0054

AUTHOR: Liventsov, A. V.; Markov, M. N.; Merson, Ya. I.; Shamilev, M. R.

TITLE: Experimental determination of the outgoing radiation from the earth, and investigation of the thermal radiation from the earth into outer space during the time of the total solar eclipse, using high altitude geophysical rockets

SOURCE: Mezhdomestvennoye soveshchaniye po aktinometrii i optike atmosfery. 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 51-54

TOPIC TAGS: earth radiation, thermal radiation, geophysical rocket, high altitude rocket, solar eclipse, infrared radiation

ABSTRACT: The results reported were obtained since 1958 with geophysical rockets shot to altitudes of 100 - 450 km. The authors stress the results of one of the experiments carried out during the total solar eclipse of 15 February 1961 in the central belt of the European part of the Soviet Union. The radiation receiver was a bismuth bolometer. The null drift caused by instability of the bolometer bridge and the

Card 1/3



L 45735-65

ACCESSION NR: AT5011155

3

dc amplifier were eliminated by using a modulation scheme. The specifications of the equipment are briefly described. The first essential result obtained during the experiments was a direct measurement of the average values of the radiation outgoing from the earth, measured from outer space. The results indicate that the radiation flux from the earth varies smoothly with angle, and does not decrease abruptly toward the earth's rim. This indicates that the high layers of the upper atmosphere have a strong influence on the angular distribution. The considerable change in the energy flux during the total phase of the eclipse also offers evidence of the appreciable contribution from the upper layers, since the thermal conditions in the lower layers and in the ground could not change noticeably during the total eclipse. The results cannot be directly compared with those by others, in view of the different experimental conditions. The data obtained make it possible to estimate the screening effect of the moon on the daytime thermal radiation of the earth's atmosphere and lead to the conclusion that although the mean theoretical values of the outgoing flux are in sufficiently good agreement with the experiment, the theoretical angular distribution needs considerable modification. "I. P. Aver'yanov, A. M. Kasatkin, and V. Ye. Shervinskiy participated in the experiment during the eclipse and in the development of the corresponding apparatus." Orig. art. has: 3 figures and 1 table. [02]

Card 2/3

L 45735-65

ACCESSION NR: A75011155

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute AN SSSR)

SUBMITTED: 25 Nov 64

ENCL: 00

SUB CODE: AA, BB

NR REF SOV: 000

OTHER: 000

ATD PRESS: 1001

Card

3/3

MARKOV, M.N.; KHOKHLOVA, V.L.

Radiation coefficients in the infrared spectral region and differences in the  $\gamma = (\text{kpc})^{1-2}$  for the seas and continents of the lunar surface. Dokl. AN SSSR 157 no.4:826-829 Ag '64 (MIRA 17:8)

1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR i Astronomicheskiy sovet AN SSSR. Predstavleno akademikom V.G. Fesenkovym.



L-17142-65 EEO-2/EWT(d)/EWT(1)/EEC(k)-2/EEG-4/EEC(t)/T/EEC(b)-2/EEG-2/  
EED(b)-3 Pn-4/Po-4/Pq-4/Pg-4/Pae-2/Pk-4/Pl-4 IJP(c)/SSD/SSD(a)/AFPL/  
ACCESSION NR: AP5000555 AFMD(t)/RAEM(a)/ESD, 85 8/0051/64/017/006/0934/0937  
CC

AUTHOR: Markov, M. N.

TITLE: Bolometer with extremely low inertia

SOURCE: Optika i spektroskopiya, v. 17, no. 8, 1984, 934-937

TOPIC TAGS: bolometer, time lag, ir absorption, ir measurement

ABSTRACT: The author describes the operating principle, construction, and test results of a bolometer having a very small time lag, intended for the investigation of nonstationary processes in the infrared region of the spectrum. The bolometer is shown in Fig. 1 of the enclosure, and consists of a current-conducting layer of a bismuth-lead alloy deposited on a quartz right-angle prism. The relative absorption decreases like the reciprocal square root of the frequency up to about 2,000 cps. The operating current is not less than 10-15 mA (in some cases 30 mA). At 250 cps the output is 0.25 V/W and the minimum sensitivity is  $10^{-8}$  W. The time constant  $\tau$  varies with the frequency like  $(1 + 2 \cdot 10^{-2})^{-1}$  and amounts to about 200  $\mu$ sec at 2,000 cps. "I thank P. A. Bazhulin and

Card 1/1

11-17142-65

ACCESSION NR: AP5000555

S. S. Dudkin for interest in the work and S. S. Dudkin for help with the preparation of the bolometers. " Orig. art. has: 2 figures and 6 formulas

ASSOCIATION: None

SUBMITTED: 30 Nov 63

SUB CODE: NP

NR REF SOV: 002

ENCL: 01

OTHER: 001

Copy 2/2

L 43197-65 EWG(v)/EWT(1) Pa-5/Pac-2 GW  
 ACCESSION NR: AP5009646 UR/0293/65/003/002/0268/0283

35  
 16  
 6

AUTHOR: Markov, M. N.; Merson, Ya. I.; Shamilev, M. R.

TITLE: Seasonal variations in the field of thermal radiation of the earth and atmosphere in the infrared region of the spectrum (on the basis of measurements from geophysical balloons in 1962-1963)

SOURCE: Kosmicheskiye issledovaniya, v. 3, no. 2, 1965, 268-283

TOPIC TAGS: thermal radiation, atmospheric radiation, upper atmosphere, aeronomy, stratosphere, mesosphere, troposphere, geophysical balloon, infrared radiation

ABSTRACT: Investigations of the earth's infrared radiation by instruments carried aloft in geophysical balloons in 1960-1961 revealed that this method yields important data for determining the general picture of the radiation of earth and space. The purpose of this paper is to report and interpret data on the angular distribution of integral infrared radiation of the earth under summer and winter conditions. These measurements, made in 1962-1963, have yielded much important information on the troposphere, stratosphere, and mesosphere. Only limited information is given on the apparatus used since in most respects it

Card 1/3

1/43192-65  
ACCESSION NR: AP5005546

was similar to that used previously (M. N. Markov, Ya. I. Merson, and M. R. Shamilev, Kosmich. issled., 1963, v.1, no. 2, 235). The instruments were carried to a height of 25-29 km by a balloon of greater volume than used before. A photograph of the balloon accompanies the text; it resembles those used in the United States for high-level atmospheric research, but no details are given. There were some changes in the instruments making it possible to measure the earth's thermal radiation during the daytime despite the presence of maximum temperature gradients in the surface boundary layer of the atmosphere and at the earth's surface. Measurements were made in the central zone of the European USSR. The records were obtained during the daytime and at angles of the sun above the horizon which were approximately identical in summer and winter. In two summer flights there were 8 periods of measurements with a total duration of 90 minutes, and 30 curves were obtained of the angular distribution of terrestrial radiation. There was one successful winter flight yielding 10 curves of angular distribution. Among the conclusions drawn are that the radiation from space attains a minimum in the space-earth transition region (at angles of sight 10-20° upward from the horizontal). Close to the zenith (40-50°), the intensity attains a maximum, but at an angle 20-30° from the zenith, the intensity again decreases. This agrees with the observations of 1960-1961. The following

Cord 2/3

14-00000-65

ACCESSION NR: AP5009646

measurements are discussed in detail (complete data are given in tables and graphs):  
a) intensity of thermal radiation at angles to  $\pm \pi/3$  from the nadir for different  
flights; b) radiation level when sighting horizontally and radiation of the meso-  
sphere; c) shape of the curves of angular distribution. Evaluations reveal dis-  
agreement between experimental data and theoretical computations. However, there  
is good agreement with respect to the scale of thermal inhomogeneities and the  
absolute values of effective temperature as determined by TIROS satellites. Orig.  
art. has: 6 figures and 7 tables. 12 [08]

ASSOCIATION: none

SUBMITTED: 01 May 64

ENCL: 00

SUB CODE: ES

NO REF SOV: 004

OTHER: 001

ATD PRESS: 3242

Card

3/3



1 40550-65 EWP(m)/EWP(t)/EWP(b), IJP(c) JD

ACCESSION NR: AP5002918

S/0109/65/010/001/0205/0206

AUTHOR: Markov, M. N.; Ogrin, Yu. F.

TITLE: Effect of temperature on the current noise in sprayed bismuth films

SOURCE: Radiotekhnika i elektronika, v. 10, no. 1, 1965, 205-206

TOPIC TAGS: current noise, bismuth film

ABSTRACT: The noise level of sprayed bismuth films, with current densities of  $10^3$ – $10^5$  amp/cm<sup>2</sup>, at 9 cps, was measured at room temperature (300K) and at liquid-nitrogen temperature (90K). Films obtained at different rates of spraying were tested. Strips of 3–5-mm long and 0.3–0.5-mm wide bismuth film sprayed on quartz-crystal backing had a resistance of 100–1,000 ohms. The noise intensity was characterized by  $\alpha = U_{nc} / U_n$ , where  $U_{nc}$  is the noise voltage with current passing the film and  $U_n$  is the noise voltage without current in the film. The measured results are:

Card 1/2

L 40550-65

ACCESSION NR: AP5002918

Spraying rate  
mg/min

$\alpha$  at:

300K 30K

200

1.2 1.15

20

1.4 1.1

Orig. art. has: 2 tables.

ASSOCIATION: none

SUBMITTED: 30Jan64

ENCL: 00

SUB CODE: SS, GP

NO REF SOV: 003

OTHER: 001

Card 2/2 308

L 22575-65 EED-2/EZO-2/EPF(n)-2/EWG(c)/EWT(1) P1-4/Pn-4/Pn-4/Pae-2 IJP(c)  
 ACCESSION NR: AP5003031 WH/CC S/0051/65/018/001/0119/0122

AUTHOR: Harkov, M. N.

TITLE: Far infrared bolometer *SB*

SOURCE: Optika i spektroskopiya, v. 18, no. 1, 1965, 119-122.

TOPIC TAGS: thermal sensor, bolometer, metal bolometer, Bi Pb bolometer, far infrared bolometer

ABSTRACT: The design and characteristics of a low-inertia metal bolometer for the far infrared region (50—1500 $\mu$ ) are described. The bolometer is based on a similar bolometer developed previously by the author for the near and intermediate infrared regions (Doklady AN SSSR, 108, 1956, 428). The bolometer consists of a glass cylinder with a plane crystal-quartz window (~1 mm thick) attached to the cylinder by epoxy glue. Inside the cylinder, the bolometer elements are mounted on an insulating steatite shoe. The shoe has two openings covered by a thin backing of nitrocellulose (of the order of a fraction of a micron) on which layers of 99.4% Bi and 0.6% Pb and blackened gold are deposited (sputtered) in vacuum. The pressure in the cylinder was  $\sim 10^{-2}$  mm Hg.

Cord 1/3



1 22575-65

ACCESSION NR: AP5003031

and the area of each sensor element 20 mm<sup>2</sup>. The responsivity of the bolometer was determined by means of the Hefner candle. For a single bolometric strip with a resistance of ~150 ohm and an area of 20 mm<sup>2</sup>, the responsivity was 2.5 v/w and the response time 35 msec. The MDE (minimum detectable energy) of the bolometer at  $7.5 \times 10^{-10}$  w/sec from the Hefner candle was  $2.5 \times 10^{-9}$  w (at 450u). When the bolometer was used in a spectrophotometer developed earlier at the Physics Institute im. P. N. Lebedev (Muzin, V. N., and A. I. Demeshina, Optika i spektroskopiya, 13, 1962, 826), it was possible to attain slits with a spectral width (approximately 2 cm<sup>-1</sup>) in the 450u region at a time constant of 10 sec and with a signal-to-noise ratio of 100. In this respect, the bolometer is far superior to the one proposed by L. Genzel and W. Eckhart (Zh. Phys., 139, 1954, 578) (4.3 cm<sup>-1</sup>) and compares favorably with a pneumatic heat sensor proposed by R. Oatjen and others (Opt. Soc. Amer., 48, 1958, 315) (1.8 cm<sup>-1</sup>). The bolometer, which is intended primarily for infrared spectroscopy, can be used successfully under laboratory and other conditions. Bolometer noise problems are analysed in detail and conditions for reducing current noise to a minimum are reviewed. Orig. art. has 2 figures. [YK]

Card 2/3

T 22575-65

ACCESSION NR: AP5003031

ASSOCIATION: none

SUBMITTED: 30 Nov 63

ENCL: 00

SUB CODE: NP,DP

NO REF SOV: 005

OTHER: 004

ATD PRESS: 3172

Card 3/3

1 47294-65 EWT(1)/ENG(V)/EEC(t) Po-4/Pe-5/Pae-2 GN

ACCESSION NR: AP5010432

UR/0033/65/042/002/0386/0389

AUTHOR: Markov, M.N.; Khokhlova, V.L.

TITLE: Different rates of heating of the eastern and western lunar limbs after an eclipse

SOURCE: Astronomicheskij zhurnal, v. 42, no. 2, 1965, 386-389

TOPIC TAGS: moon, lunar surface, lunar limb, lunar eclipse, lunar temperature

ABSTRACT: Observations of lunar thermal emission made during the lunar eclipse of 7 July 1963 in the spectral region 8-14 $\mu$  revealed that the lunar surface at the eastern and western limbs of the disk was heated at a different rate after emergence from the shadow. During the eclipse the moon was scanned continuously from west to east. Fig. 1 of the Enclosure shows the change in the measured heat flux from an area of 100 x 60 km on the moon with an increase in illumination  $\Phi$  ( $\Phi$  is the relative illumination of the area compared to the illumination at the time of the full moon). The three curves correspond to areas situated at distances from the center of the disk  $r = 0.96R$ ,  $0.93R$ , and  $0.45R$ ). Along the y-axis the authors show the temperature scale, computed from measured intensities with allowance for atmospheric transparency, geometry of the telescope and instrument and on the assumption that the lunar surface radiates as a black body. At the time of observation the western limb had been illuminated by the sun

Card 1/4

L 47294-65

ACCESSION NR: AP5010432

for about two weeks, whereas the terminator recently had passed across the eastern limb. The curves for the eastern limb reveal some lag in the temperature increase in the initial stages of heating. This lag can possibly be attributed to the fact that on the eastern limb the energy penetrating into the depths of the surface as a result of heat conductivity is greater than on the western limb, since in the first case there are large temperature gradients in the surface layer. The delayed temperature increase with continuous arrival of solar energy can also be caused by phase transition processes or changes in the state of matter in the surface layer. These two effects cannot be separated at present. However, if thermal inertia makes a large contribution, the discovered lag in heating can be used in an attempt to determine the parameter  $\gamma = (k \rho c)^{-1/2}$ , where  $k$  is heat conductivity,  $\rho$  is density, and  $c$  is specific heat capacity. The authors find on this basis that the value of  $\gamma$  for the upper decimeter layer is  $\gamma = (k \rho c)^{1/2} \approx 600-900$ . Orig. art. has: 4 formulas and 4 figures. [08]

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Science SSSR); Astronomicheskiy soviet Akademii nauk SSSR (Astronomical Council, Academy of Sciences, SSSR)

Card 2/4

1 47294 65

ACCESSION NR: AP5010432

SUBMITTED: 22Aug64

ENCL: 01

SUB CODE: AA

NO REF SOV: 002

OTHER: 001

ATD PRESS: 3254

Card 3/8

L 2798-66 FSS-2/ENT(1)/FCC GS/GW  
 ACCESSION NR: AT5023569

UR/0000/65/000/000/0090/0093

AUTHOR: Markov, M. N.; Merson, Ya. I.; Shamilev, M. R.  
 44,55 44,55 44,55

TITLE: Investigation of the angular distribution of terrestrial and atmospheric radiation using geophysical rockets and balloons

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 90-93

TOPIC TAGS: atmospheric radiation, angular distribution, meteorologic rocket, meteorologic balloon, IR radiation

ABSTRACT: The authors report on a systematic study of infrared radiation from the earth which was begun in 1958. The angular distribution of terrestrial radiation was measured in the 0.8-40  $\mu$  spectral region using rocket equipment at altitudes of 100-500 km and geophysical balloons at altitudes up to 30 km. The viewing angle was 2 $\pi$ , angular resolution was  $2 \cdot 10^{-3}$  rad, threshold of sensitivity— $10^{-8}$ - $10^{-9}$  watt. The readings were recorded by self-contained systems and by telemetry. The rockets and balloons were launched during various seasons of the year, at various times of

Card 1/3



L 2798-66

ACCESSION NR: AT5023569

day and under various geographical conditions within the boundaries of the Soviet Union. About 50 launchings in all were made. The experimental setup is shown in fig. 1 of the Enclosure. It was found that the contribution of atmospheric radiation to the heat flow emanating from the planet is considerably greater than could be accounted for by existing hypotheses (especially at great thicknesses which correspond to large zenith angles). It is therefore assumed that the effective altitude of the radiating atmosphere reaches 150 km. The high-altitude distribution of atmospheric radiation has a layered structure (which is clearly defined at altitudes above 150 km). An increase in radiation intensity is observed, chiefly in the 2.5-8  $\mu$  spectral region, at altitudes of about 280, 430 and 500 km. There are no small-scale non-uniformities on the curve for angular distribution of terrestrial radiation. Diurnal variations in the curve are also small. Seasonal changes and those due to variations in climate and geography are more pronounced. Orig. art. has: 6 figures, 1 table. [14]

ASSOCIATION: none

SUBMITTED: 02Sep65

NO REF SOV: 000

Cord 2/3

ENCL: 01

OTHER: 000

SUB CODE: ES, SV

ATD PRESS: 4/02

ENCLOSURE: 01  
0

L 2798-66  
ACCESSION NR: AT5023569

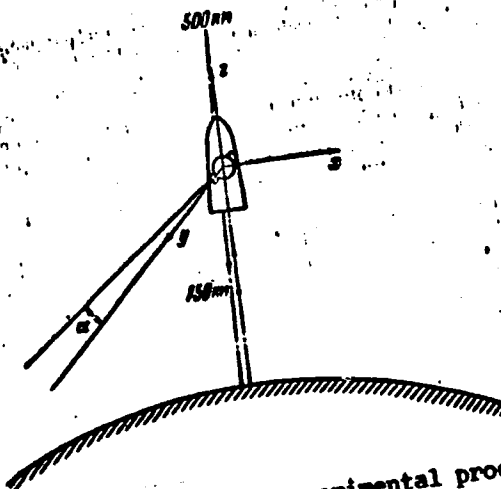


Fig. 1. Diagram of the experimental procedure

BVI  
Card 3/3



L 2964-66 FSS-2/ENT(1)/FS(v)-3 TT/CS/GW  
 UR/0000/65/000/000/0094/0103  
 ACCESSION NR: AT5023570 77  
 BH

AUTHOR: Bazhulin, P. A.; Kartashev, A. V.; Markov, M. N.  
 44,55 44,55 44,55

TITLE: Angular and spectral distribution of terrestrial radiation in the infrared region of the spectrum

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 94-103

TOPIC TAGS: atmospheric radiation, IR radiation, radiation detector, IR spectrometer, instrumentation satellite, radiation detection

ABSTRACT: This article describes the equipment and results of spaceborne measurements of the angular and spectral distribution of terrestrial radiation at high altitudes. Simultaneous recordings of angular and spectral distribution were carried out at 4-38  $\mu$  within angles of  $\pm\pi/2$  from the nadir over the middle latitudes of the European USSR on 6 and 18 June 1963. A special IR pulse spectrometer developed for the measurements is shown in Fig. 1 of the Enclosure. It operates as follows: A flat scanning mirror rotates through the angle  $\pi/2$  (scanning time, 100 sec), and a spherical

Card 1/4

L 2961-66

ACCESSION NR: AT5023570

Cassegrainian objective (diameter, 33 mm; focal length, 200 mm) directs the radiation onto a low-inertia bolometer. The bolometer has a time constant of 5—7 msec, resistance of 1000 ohm, and dimensions of the receiving surface of 0.3 x 9 mm. The radiation beam is intersected by the plates of a rotating (7 rps) modulator. The plates are made of quartz, fluorite, and lithium fluoride, and a nontransparent metallic plate is also included. The plates are situated asymmetrically in order to code the position of signals from individual plates in time. The signals from the bolometer are fed to a wide-band pulse amplifier with a bandpass of 0.5—200 cps and a gain of  $10^5$ . The amplified signals are transmitted to the ground by the telemetry system. The measurements yielded the following conclusions: In the broad bands of the IR spectrum, the common shape of the curves of the angular distribution corresponds to that for radiation of a relatively isotropic object. The deviation from the isotropy on the edges of the Earth's disk is smaller during observations at 400—500 km than during observation at 25—30 km. Individual measurements showed no noticeable difference in the thermal radiation intensity between day and night. A slight dependence of the shape of the angular distribution curves on height at 200—500 km was noted. It was also found that in many cases the radiation maximum is located in the spectral region of 4.5—8.5  $\mu$  and that the effective temperatures for this region are higher (270—280K) than for other regions of the spectrum. Orig. art. has: 7 figures and 2 tables. [GS]

Card 2/4

L 2964-66

ACCESSION NR: AT5023570

ASSOCIATION: none

SUBMITTED: 02Sep65

NO REF SOV: 005

ENCL: 01

OTHER: 002

SUB CODE:

ATD PRESS: 4109

Cord 3/4

L 2964-66

ACCESSION NR: AT5023570

ENCLOSURE: 01

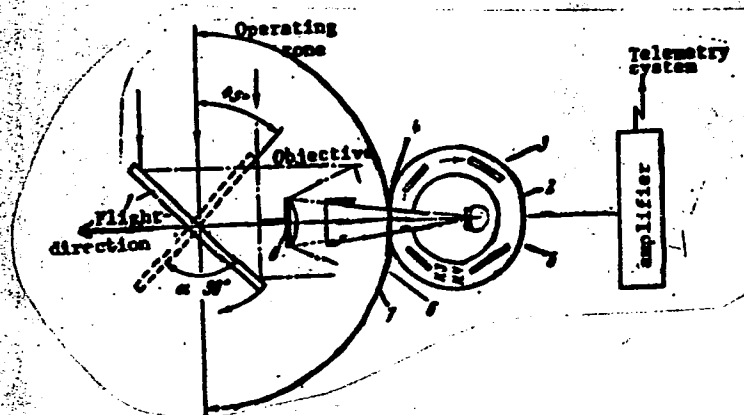


Fig. 1. Block diagram of IR pulse spectrometer

1 - Scanning mirror; 2 - bolometer; 3 - modulator;  
4 - sealed window; 5 - slotted diaphragm; 6 - internal tube; 7 - spherical mirror (1); 8 - spherical mirror (2).

BVK  
Card 4/4